

PCBA FA METHODOLOGIES AND TYPICAL CASE STUDIES

■ Course Background

The continuous research to improve product functionality and application has led electronic product to have more and more complicated design like high PCB layer counts, finer component pin pitch, densely populated board, and so on that requires advance manufacturing machines, process, environment and raw materials. But even with all these “advance” manufacturing controls and setup, we cannot avoid to have some failures that need systematic approach of analysis together with the use of sets of FA methodologies. And product failure at end customer side has a devastating effect ranging from customer dissatisfaction to a more serious problem such as safety issues that may cause loss of asset or even lives. With this, determining the root cause (s) is very important.

■ Course Summary and Benefits

In electronic product, failure is the state of an apparatus or system in which it cannot perform or give its intended function or output. In order to determine the cause of its failure the failure analysis engineer needs to implement the process of collecting and analysing data by using a wide array of methods. Once failure root cause is detected, it will help us fix the problem at its source and prevent it from occurring again. With our highly experienced and are experts in fields, in this presentation, we will be discussing some of the PCBA FA methodologies liked physical fracture / grain / microstructural analysis, compositional / phase diagram analysis of mixed-up alloy, corrosion/dendrite analysis, microdeformation ($\mu\epsilon$) analysis, some tips on how to start your FA, what methodologies are applicable, how it can help to find the root cause, when to use it, and some of the actual case samples that we successfully identified for the root cause.

■ Target Audience

Personnel engaged in failure analysis - FA engineers, process engineers, quality engineers, reliability engineers, designers and management personnel.

■ This course will cover the following topics

I. Introduction to PCBA Failure Analysis

1. Introduction
2. Terminologies and industry standards
3. Failure analysis principles
4. Basic FA procedure
5. Typical PCBA failure modes

II. Introduction to Typical PCBA FA Methodologies

1. X-Ray Analysis
2. Cross-section Analysis
3. Dye and Pry Analysis
4. Scanning Electron Microscopy (SEM)
5. Energy-dispersive X-ray spectroscopy (EDX)
6. Fourier Transform Infrared Spectroscopy (FTIR)
7. Ion Chromatography
8. Strain measurement analysis
9. Other techniques

III. Methodologies Applications and Case Analysis

1. Failure analysis cases due to Material Defects
 - 1.1 Raw PCB related defects
 - 1.2 Typical defects caused by Solder material
 - 1.3 Component related defects
 - 1.4 Corrosions cases analysis
 - 1.5 PCB surface finishing and joint integrity
2. Failure analysis cases due to Manufacturing process defects
 - 2.1 SMT related defects
 - 2.2 Wave soldering related defects
 - 2.3 Rework related defects
3. Failure analysis cases related to ionic contamination
 - 3.1 Raw component analysis
 - 3.2 Chemicals used in assemblies
 - 3.3 Dendrite cases analysis
4. Failure analysis cases due to mechanical stress
 - 4.1 SMT Assembly process induced defects
 - 4.2 Board test process induced defects
 - 4.3 Mechanical assembly related defects
 - 4.4 Shipping and transport related defects
5. Other FA Methodologies Applications
 - 5.1 PSA (ACF) cure percentage analysis
 - 5.2 Surface contamination analysis
 - 5.3 Plastic Fire Retardant P element evaluation
 - 5.4 Fluorescence dye for CMC crack analysis